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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/785,430	02/23/2004	Walter D. Micher	KLA1P117X1F/P1151/7	8601
61736	7590	10/03/2006	EXAMINER	
BEYER WEAVER & THONAS LLP			STOCK JR, GORDON J	
P.O. BOX 70250			ART UNIT	
OAKLAND, CA 94612			PAPER NUMBER	

2877

DATE MAILED: 10/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/785,430

Applicant(s)

MIEHER ET AL.

Examiner

Gordon J. Stock

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 December 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>20050516;20041108;20040816</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on May 26, 2005; November 8, 2004; and August 16, 2004 have been considered by the examiner.

Drawings and Specification

2. The specification is objected to for the following: on page 42 line 7 'modulation device 532' should read –modulation device 552-; on page 43 line 9 'mirror 574' should read –mirror 572-; on page 74 lines 4 and 6 'targets 1008' should read –targets 1008a-1008d-; on page 79 line 10 '152' should read -1152-; on page 82 line 7 the U.S. Provisional Application No. needs to be updated; on page 85 lines 8 and 13 '116' should read –1166-. Corrections required.
3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: **T2** of Fig. 2a..
Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.
4. The drawings and specification are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the

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description: OVL of Fig. 3b; 502, 503, 504, 505, 506, 508, 509, 510, 512, 514, and 524 of Fig. 5a; 704 of Fig. 7; 1184 and 1188 of Fig. 11f. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

5. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 101

6. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

7. **Claims 1-21** are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. In **claim 1** the steps of obtaining scatterometry overlay data and obtaining imaging overlay data are abstractions without a tangible result. **Claims 2-21** are rejected for depending upon a rejected base claim; wherein **claims 2-21** further limiting of the parent claim still does not have a tangible result. Merely 'obtaining data' would not appear to

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be sufficient to constitute a tangible result, since the outcome of the 'obtaining' has not been used in a disclosed practical application nor made available in such a manner that its usefulness in a disclosed practical application can be realized. See OG Notices: 22 November 2005, "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility".

Specifically: Part b. *Practical Application the Produces a Useful, Concrete, and Tangible Result* under Section IV *Determine Whether the Claimed Invention Complies with the Subject Matter Eligibility Requirement of 35 U.S.C. Sec. 101*, sentence 3, in the OG Notice from 22 November 2005 states 'In determining whether the claim is for a "practical application," the focus is not on whether the steps taken to achieve a particular result are useful, tangible, and concrete, but rather that the final result achieved by the claimed invention is "useful, tangible, and concrete."'

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. **Claims 1, 6, 7, 18, 19, 20**, are rejected under 35 U.S.C. 102(e) as being anticipated by **Yang et al. (6,982,793)**.

As for **claims 1 and 20**, Yang in a method and apparatus for using an alignment target with designed in offset discloses the following: providing targets A, B, C, D that each include a portion of the first and second structures on a first and second layer of a sample (Fig. 15: 252,

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254, 256, 258); wherein the target A (Fig. 15: 252) is designed to have a predefined offset, D , between its first and second structures portions (Fig. 15: 252, D); wherein the target B (Fig. 15: 254) is designed to have a predefined offset, $-D$, between its first and second structures portions (Fig. 15: 254, $-D$); wherein the target C (Fig. 15: 256) is designed to have a predefined offset, $D + d$, between its first and second structures portions (Fig. 15: 256, $D + d$); wherein the target D (Fig. 15: 258) is designed to have a predefined offset, $-D-d$, between its first and second structures portions (Fig. 15: 258, $-D-d$); illuminating the targets A, B, C, and D with EM radiation to obtain spectra S_a , S_b , S_c , and S_d from targets A-D respectively using an optical system such as a scatterometer (col. 16, lines 38-40; Fig. 12c); determining any overlay error between the first structures and the second structures using linear approximation based on the obtained spectra (Fig. 16: equation 8; col. 16, lines 40-50); a scatterometry module for illuminating the targets thereby a scatterometry overlay technique is used (Fig. 12c: 145; col. 11, lines 50-55; col. 12, lines 20-35); a processor operable for analyzing optical signals, spectra, for determining any overlay error through obtaining scatterometry overlay data (Fig. 12c: 147 and 148) that uses a scatterometry technique (col. 12, lines 20-35); wherein, imaging scatterometry overlay metrology is used for two sets of targets (Fig. 26a: 802b and 802a with 816; Fig. 26b: imaged scatterometric spectral overlay data).

As for **claim 6**, Yang discloses everything as above (see **claim 1**). In addition, the measured signals are in the form of a characteristic of one or more images of the first target set, a spectral characteristic (Fig. 26b).

As for **claim 7**, Yang discloses everything as above (see **claim 1**). In addition, he discloses simultaneous scatterometry and imaging overlay data being obtained for two sets of

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targets for the system is an imaging scatterometric system (Fig. 26a: 802a, 802b, 800, 816); wherein the selection is position (Fig. 26a: 802a, 802b; Fig. 26b: sample position with spectral position).

As for **claim 18**, Yang discloses everything as above (see **claim 1**). In addition, he discloses each first structure has a first center of symmetry and each second structure has a second center of symmetry; wherein, the first center of symmetry and the second center of symmetry for each target are offset with respect to each other by a selected one of the predefined offsets (Fig. 24: 700, 702, 704).

As for **claim 19**, Yang discloses everything as above (see **claim 1**). In addition, he discloses determining the overlay error without comparing the optical signals to calibration data (col. 16, lines 50-60).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

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invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. **Claim 21** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Yang et al. (6,982,793)** in view of **Niu et al. (6,699,624)**.

As for **claim 21**, Yang discloses everything as above (see **claim 1**). He does not explicitly state a phase based technique; he does disclose ellipsometry (Fig. 12b). However, Niu in an overlay metrology method teaches using phase in ellipsometry (col. 4, lines 65-67). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to use a phase-based technique such as ellipsometry in order to measure the profile of the gratings for overlay calculation.

Allowable Subject Matter

13. **Claims 2-5, 8-17** would be allowable if rewritten to overcome the rejection under 35 U.S.C. 101 and rewritten to include all of the limitations of the base claim and any intervening claims.

As to **claim 2**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a method for determining an overlay error 'wherein, the scatterometry overlay tool is used to measure the measured optical signals from the first target set and the imaging overlay tool is used to generate the image from the second target set, in combination with the rest of the limitations of **claims 2-5**.

As to **claim 8, 9, 11, 12, 13, and 17** the prior art of record, taken alone or in combination, fails to disclose or render obvious in a method for determining an overlay error the particular criteria selected, in combination with the rest of the limitations of **claims 8-15 and 17**.

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As to **claim 16**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a method for determining an overlay error 'using the scatterometry overlay data to calibrate a tool used for obtaining the imaging overlay data, in combination with the rest of the limitations of **claim 16**.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: US 2005/0122516 to Sezginer et al.

U.S. Patent 6,819,426 to Sezginer et al.

The following are citations from IDS of May 16, 2005 that were crossed out by Examiner. The Examiner has corrected the pertinent pages of each publication:

TDB, "Mask Overlay Determination," IBM Technical Disclosure Bulletin, December 1978, pp. 2772-2773. www.delphion.com

Kim, Young-Chang et al., "Automatic In-Situ Focus Monitor Using Line Shortening Effect," Journal: Proceedings of the SPIE, vol. 3677, pt. 1-2, pp. 184-193.

Sherman, Enrique R., "Characterization and Monitoring of Variable NA and Variable Coherence Capable Photo Steppers Utilizing the Phase Shift Focus Monitor Reticle," Journal: Proceedings of the SPIE, vol. 2439, pp. 61-69.

Bischoff, Jorg et al., "Modeling of Optical Scatterometry with Finite-Number-of-Periods Grating," Journal: Proceedings of the SPIE, vol. 3743, pp. 41-48.

Baumbach, T. et al., "Grazing Incidence Diffraction by Laterally Patterned Semiconductor Nanostructures," Journal: Journal of Physics, vol. 32, no. 6, pp. 726-740.

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Uchida, Norio et al., "A Mask to Wafer Alignment and Gap Setting Method for X-Ray Lithography Using Gratings," Journal: Journal of Vacuum Science & Technology B, vol. 9, no. 6, pp. 3202-3206.

Ina, Hidecki et al., "Alignment Mark Optimization to Reduce Tool and Wafer-induced Shift for XTRA-1000," Japanese Journal of Applied Physics, vol. 38, no. 12B, pp. 7065-7070.

Fax/Telephone Numbers

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and

2) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

Papers related to the application may be submitted to Group 2800 by Fax transmission. Papers should be faxed to Group 2800 via the PTO Fax machine located in Crystal Plaza 4. The form of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CP4 Fax Machine number is: (571) 273-8300

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (571) 272-2431.

The examiner can normally be reached on Monday-Friday, 10:00 a.m. - 6:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr., can be reached at 571-272-2800 ext 77.

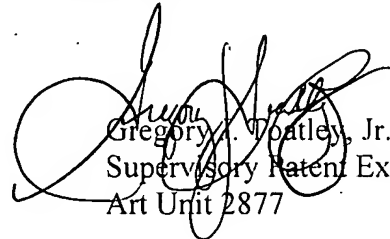
Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

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may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private Pair system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

gs

September 26 , 2006


Gregory A. Toatley, Jr.
Supervisory Patent Examiner
Art Unit 2877